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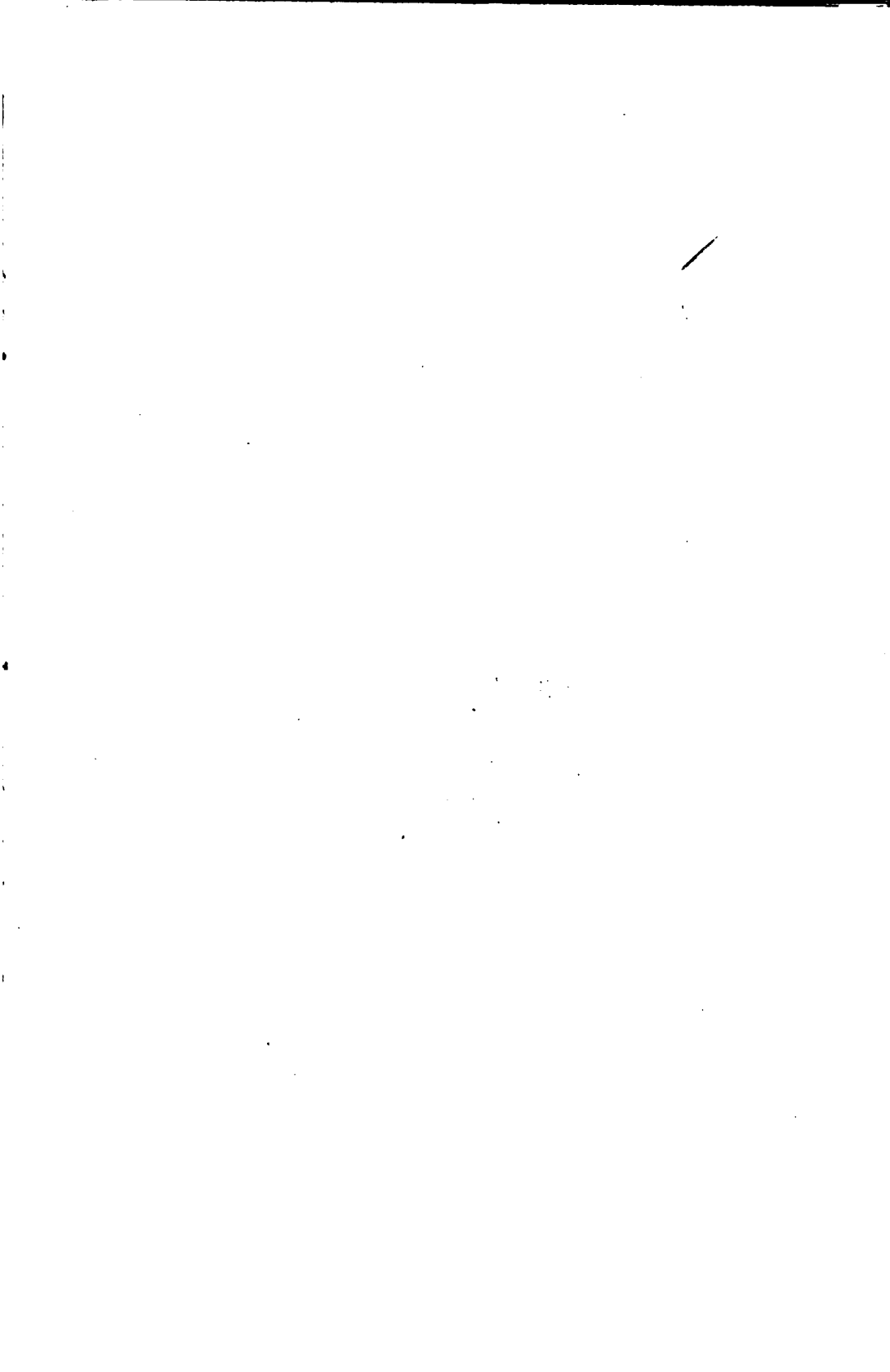
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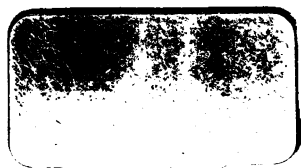
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# TO REGULATE RADIO COMMUNICATION

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## HEARINGS

APRIL 28, 1910

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### ON THE BILL (S. 7243) TO REGULATE RADIO COMMUNICATION

BEFORE THE

U. S. Congress

COMMITTEE ON COMMERCE OF THE SENATE  
OF THE UNITED STATES

SIXTY-FIRST CONGRESS, SECOND SESSION

CONSISTING OF

WILLIAM P. FRYE, of Maine, *Chairman*.

STEPHEN B. ELKINS, of West Virginia.

KNUTE NELSON, of Minnesota.

JACOB H. GALLINGER, of New Hampshire.

BOIES PENROSE, of Pennsylvania.

CHAUNCEY M. DEPEW, of New York.

GEORGE C. PERKINS, of California.

SAMUEL H. PILES, of Washington.

WILLIAM ALDEN SMITH, of Michigan.

JONATHAN BOURNE, Jr., of Oregon.

THEODORE E. BURTON, of Ohio.

THOMAS S. MARTIN, of Virginia.

WILLIAM J. STONE, of Missouri.

F. M. SIMMONS, of North Carolina.

JAMES P. CLARKE, of Arkansas.

FRANCIS G. NEWLANDS, of Nevada.

JOHN H. BANKHEAD, of Alabama.

WOODBURY PULSIFER, *Clerk*.

FREDERICK B. SANDS, *Assistant Clerk*.

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TO REGULATE RADIO COMMUNICATION.

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WEDNESDAY, April 28, 1910.

The committee met at 11 o'clock a. m.

Present: Senators Frye (chairman), Elkins, Penrose, Piles, William Alden Smith, Bourne, and Newlands.

The CHAIRMAN. This hearing will commence. I have sent for a stenographer, and everything that is said will be taken down for the use of the committee.

The committee will hear from Mr. Chamberlain for two or three minutes.

**STATEMENT OF EUGENE T. CHAMBERLAIN, COMMISSIONER OF NAVIGATION, DEPARTMENT OF COMMERCE AND LABOR.**

Mr. CHAMBERLAIN. Mr. Chairman, I will only occupy not to exceed five minutes, for several reasons. The necessity for regulation of wireless telegraphy has already been recognized by every civilized nation of importance in the world. Every nation except the United States—not every nation possibly—but every nation of maritime consequence, is a party to the Berlin convention for the regulation of wireless telegraphy, which was enacted in 1906 and is now in force, and its provisions are very much more stringent than anything that is contemplated by the bill pending and before the committee.

There were certain difficulties in the way of the ratification of that treaty in this country. As a rule the telegraph systems abroad, especially throughout continental Europe, are owned by the Government. They are a part of the post-office system. Such, of course, is not the case in this country, and the ratification of that treaty would have raised several constitutional questions, several questions of administration which would have been very hard to meet. The necessity, however, to return to that point for regulation is conceded everywhere.

Second, the necessity for regulation in the United States has been dwelt on by all the departments of the Government that have anything to do whatever with the subject of wireless telegraphy. Those departments are primarily the Navy Department and the War Department, and incidentally the Department of Commerce and Labor, in behalf of which this committee reported not long ago a bill for acquiring wireless telegraphy on ships; also the Department of Agriculture and the Treasury Department, which through the Revenue-Cutter Service, has to use wireless messages in going to the rescue of ships in distress at sea.

I need hardly take your time to elaborate the argument on these points, because you will find them all incorporated in the reports of the House committee which has had this bill before it while this

committee was occupied with the river and harbor bill. The House committee gave extensive hearings, covering several weeks, and was enabled to report the bill. I would like, if it would be agreeable to the committee, and would add to the understanding of the matter, to have the House report, or at least the portion of it containing the recommendations of the Navy Department, the War Department, the Department of Commerce and Labor, and the Treasury Department, incorporated here in the hearings.

Senator BOURNE. I think, Mr. Chairman, it would be a good idea if the commissioner would just state the necessity of it in a few words. We can read the reports afterwards.

Mr. CHAMBERLAIN. The necessity for regulation—and regulation here goes to a limited extent—I will leave with the committee; also a statement quoting the figures of the Supreme Court as to the constitutionality of the legislation proposed.

The necessity for this legislation is caused by the constant and conceded interference on the part of the different wireless stations with one another. The reason that the Government is interested in that is primarily in the matter of the transmission of messages relating to safety of life at sea; secondarily, in relation to messages relating to the army and navy, which are, of course, of material consequence to the Government. The Treasury messages relate almost entirely to the dispatch of revenue cutters and the relief of ships. The army and navy dispatches are, of course, easily explained in the line of their own particular business, and are generally in cipher.

Senator BOURNE. Of what does this interference consist?

Mr. CHAMBERLAIN. This interference consists in breaking up messages, rendering messages unintelligible. They consist, in brief, like the interference with a speech, for example, by a racket; not always by interruption with a point, but frequently with interruptions for the purpose of breaking up the orderly dispatch of business.

As I say, the origin of this legislation dates away back to the Berlin Conference of 1903. The first conference was in 1903. The second one was in 1906. For the last two years the various branches of our Government have been endeavoring to shape up a bill that would work satisfactorily, and that means a limit; not such regulation by a very long way as is imposed abroad, but just sufficient regulation to accomplish the results desired.

With regard to the wireless-telegraph companies—I can not go into that because the committee evidently has not the time, but it has been discussed by them before the House. Two companies have gone before the House on bills, each one of them drawn, of course, in its own favor for the same purpose, and all concede the necessity for regulation.

Senator BOURNE. Does the necessity for this regulation come principally from companies with established stations or from amateurs?

Mr. CHAMBERLAIN. It comes from both.

Senator BOURNE. How does this bill cure that evil now existing?

Senator PILES. A station can not be operated unless it is licensed under such regulation as may be prescribed.

Senator BOURNE. The license is simply for identification. I do not see how that prevents interference.

Mr. CHAMBERLAIN. Senator, the regulation is proposed primarily by the assignment of wave lengths. Now, if wave lengths would suffice, the bill would stop right there, so far as most of us are concerned. But it is the consensus of opinion of the wireless people that that will not suffice. We have put in the bill the words "or otherwise," which will be criticised. Now, that is a very broad word, and it is used relatively.

Senator BOURNE. What part of the bill?

Mr. CHAMBERLAIN. If you will turn to page 4, section 4, line 12.

The CHAIRMAN. Mr. Commissioner, you are taking more time than I think ought to be given under the circumstances. There are quite a number of gentlemen who have come here in opposition to the bill.

Senator PILES. I think we understand what is wanted.

The CHAIRMAN. And I think that they ought to be heard now instead of those who live here.

Mr. CHAMBERLAIN. I was only answering questions.

The CHAIRMAN. You can be heard later on just as well as now and so can the gentlemen from the Army and Navy and Treasury departments be heard later on by the committee, but these gentlemen who have come here some distance I think should be heard now.

In opposition to the bill the committee will hear anyone as briefly as possible.

#### STATEMENT OF MR. JAMES H. HAYDEN.

Mr. HAYDEN. I represent the National Electric Signaling Company of Pittsburg, which desires to be heard in opposition to this bill.

Mr. Chairman and gentlemen, we concede that signals of distress from vessels at sea should be protected from interference for humanitarian reasons and that radio-communications of the Government should be protected, particularly those of the army and navy, for patriotic reasons. Our objection is not to the establishment of regulations for the protection of such messages, but to the manner in which this bill provides that the protection shall be accomplished. Your attention has been called to the report upon a bill identical with the one under consideration, made by Mr. Greene, from the Committee on Merchant Marine and Fisheries. He states correctly (p. 4):

The core of the bill is in the fourth section, which provides that—

"For the purpose of preventing or minimizing interference with messages or signals relating to vessels in distress or of naval or military stations by private or commercial stations, the President of the United States shall establish from time to time regulations by designation of wave lengths or otherwise to govern said private or commercial stations."

That section contemplates giving to distress calls from vessels at sea and to public messages an unrestricted priority in radio communication over all private messages and commercial business. That we believe is unnecessary and that the distress calls and public business can be protected better, in the manner proposed by a bill (H. R. 22558) introduced in the House of Representatives by Mr. Burke, of Pennsylvania. Instead of giving messages of those two classes unrestricted priority, the Burke bill contemplates giving some executive officer of the Government, perhaps the President or the Secretary of Commerce and Labor, authority to reserve certain ranges of wave

lengths for the exclusive use of distress calls and public business within which each would have exclusive rights, and upon which reservations all others would be forbidden to encroach. There would be one reservation of wave lengths for calls of distress, another reservation or several of them for departments of the Government. That plan would assure to them immunity from interference from any source. Outside of these reservations the entire range of wave lengths would be left free for the use of the public in general.

I shall show one way in which the bill under consideration would fail to provide as efficient protection for public business as the Burke bill. A government station making its call might find that there was another station sending a signal by the same wave length. It could not establish the communication desired until it has induced the private station to cease operating. The latter, acting in entire good faith, might not hear the call of the government station and continue to operate, thus delaying the transaction of the public business. But if the government station had a range of wave lengths set apart for its exclusive use, as contemplated by the Burke bill, it would be assured of finding that range free at all times and there would be no delay. From the standpoint of the commercial station, this latter plan would have great advantages over the one contemplated by the Depew bill. Suppose, with the Depew bill in force, a commercial station were in the act of sending an important message, possibly one relating to the dispatch of trains and involving the safety of the traveling public. A government station arbitrarily choosing the same wave length might at any time compel the commercial station to suspend operations abruptly and indefinitely. No commercial station could begin sending a message with certainty that it could complete it. The result would be great embarrassment, not alone to wireless interests, but to the general public employing wireless stations. This would not occur if the Government had its own range of wave lengths as contemplated by the Burke bill.

A fair comparison of the two schemes of regulation may be illustrated by this example: Take a drawing-room car containing 24 seats. According to the Burke plan 24 tickets would be sold, and in accordance with their common practice each ticket would entitle its holder to one certain seat. All ticket holders would be accommodated and there would be no confusion. According to the Depew plan, each of the 24 tickets would entitle the holder to admission to the car, without designating any particular seat. Two of the tickets would provide that the holders thereof might, from time to time, take any seats in the car that they pleased, whether occupied by the holders of some of the nonprivileged 22 tickets or not. This would certainly occasion inconvenience to the 22 persons and it would not accommodate the privileged passengers better if, in order to secure seats, they had to eject other persons instead of being provided with definite seats of their own. It would not be as advantageous to the privileged few to have the right to any seats rather than be sure of finding a certain seat vacant. At the same time the convenience of the remaining 22 passengers would be very much enhanced if they knew where and how they were going to be accommodated.

Senator BOURNE. One wave length will not interfere with another, will it?

Mr. HAYDEN. That is a proposition, sir, that can hardly be questioned.

Senator BOURNE. I am only asking for information.

Mr. HAYDEN. Radio communication is established by vibrations of a medium called ether, resembling in some respects vibrations of the atmosphere which transmits sound. Waves of the ether like waves of sound can be regulated and measured. Waves of different lengths do not interfere with one another. To illustrate: Strike the C note on a piano and the C string of a violin in the same room will vibrate in sympathy with it; but no other string on the violin will vibrate. In the same way, if the sending apparatus of a wireless station causes vibrations of the ether, having a certain wave length, and there are receiving stations similarly attuned, they will vibrate in sympathy with the sending station and record its message. That receiving station will not respond to any other wave length.

Senator BOURNE. How many wave lengths are recognized?

Mr. HAYDEN. They are limitless.

Senator BOURNE. Then it is feasible and practicable to segregate these wave lengths when there are so many different ones?

Mr. HAYDEN. Yes, sir.

Senator BOURNE. And to set aside certain wave lengths for relief purposes only?

Mr. HAYDEN. Yes, sir.

Senator BOURNE. It is feasible?

Mr. HAYDEN. Yes, sir; absolutely.

The CHAIRMAN. Does any one dispute that fact?

Mr. HAYDEN. Mr. Chamberlain, in his opening remarks, said that it was generally conceded that a regulation by reservation of wave lengths would not be sufficient for the prevention of interference. We have never made that concession. We are convinced that it would be sufficient. Radio communication being effected by vibrations of ether, the rapidity of the vibrations—i. e., the length of waves produced, control the communication between the sending and receiving station. We know of no means other than by regulation of wave lengths to prevent interference. Interference results when two or more stations in the same neighborhood employ the same wave lengths at the same time. But by adopting different wave lengths and suitable appliances, two stations close to one another can send messages at the same time and not interfere with one another. On that subject I will quote from a report of Rear-Admiral H. M. Manney, U. S. Navy, Chief of the Bureau of Equipment, dated April 17, 1905:

The interference preventer will practically exclude any wave varying in length by as much as 3 per cent from the wave to which the preventer is adjusted, provided the intensity of such interfering wave is not greater than that of the wave to be received. As the interfering wave increases in relative intensity, the difference in wave length must be increased also. Unless very accurately adjusted, the interference preventer absorbs part of the strength of the wave, and the more imperfect the adjustment the greater the absorption. The adjustment of the interference preventer is somewhat difficult, but once made, it is practically constant.

With this connection it is possible to absorb or shunt to earth waves so strong that close connected they will burn out the receiver, and at the same time to build up a weak resonant wave to sufficient strength to be read. *A variation of 10 per cent in wave length has been found sufficient to cut out waves so strong that they could not be received direct either on the electrolytic or coherer receivers, while at the same time a weak wave which the coherer would just record was plainly received on the telephone. With waves of more nearly equal intensity a variation of 3 per cent in length is ample.*

Senator BOURNE. These wave lengths can be described so that they can be legalized, can they not?

Mr. HAYDEN. I think the term "wave lengths" is now well recognized in the art and has been found satisfactory.

In general, our proposition is that instead of giving any class of messages an unrestricted priority, messages of that class would be protected more efficiently by setting apart for them exclusively an allotment or reservation of wave lengths. We believe that that is all the protection necessary to insure immunity from interference. Commercial and scientific interests should not be ignored altogether. They could proceed with their work, avoiding wave lengths reserved for distress calls and public business. But to make private stations always subject to arbitrary interruptions by the Government would prevent them from doing their work successfully. There is no necessity or excuse for giving such priority.

Senator BOURNE. And you hold it a menace to your business?

Mr. HAYDEN. Yes, sir.

Mr. CHAMBERLAIN. I would like to ask merely one question. Did not the bill to which you refer—the Fessenden bill—provide not only for reservations of wave lengths, but also that the regulations should be through some process known as the dampening of wave lengths, the precise meaning of which I have never been quite able to understand? I believe the bill had other propositions that I can not recall now, but that bill, the Fessenden bill, did not stop, as I recall it, with the mere matter of wave lengths. It had a provision in it with regard to the dampening of wave lengths, whatever that may be.

Mr. HAYDEN. I will reply to that in a moment, sir. We believe that the regulation of radio communication by the reservation of certain wave lengths would be sufficient to provide protection for any class of messages. A reservation of wave lengths for the exclusive use of the Government would mean that no private station would use those wave lengths and the Government would not suffer from interference.

Mr. Burke's bill as originally introduced did provide that waves sent out from a station in train should be so dampened that the amplitude of the waves would not vary more than a certain amount—that is to say, that the waves should be uniform in height and shape. If the waves issued are irregular in these particulars, some of them being steeper than others, the result is that the station sending them occupies more than its fair share of the entire range of wave lengths.

With the committee's permission, I shall submit a memorandum of the amendments to this bill that we should like to have the committee consider, along with our reasons for asking them.

Senator BOURNE. Do you concede that the wave lengths can be classified, and that such classification can be legalized?

Mr. HAYDEN. There does not seem to be any doubt about that.

#### STATEMENT OF MR. FRANCIS W. H. CLAY.

Mr. CLAY. I represent the National Electric Signaling, the same company that Mr. Hayden does, which by the way is a company mainly engaged in developing the system as a scientific matter of investigation, engaged not so much in commercial work just now, as in the experimental work. Now, I can speak as Mr. Hayden could not

as being familiar with such developments of the art as are unknown to the public, because I am attorney for Professor Fessenden who is acknowledged to be one of the foremost investigators of the art.

Along the line of Mr. Hayden's remarks as to the advantage of a reservation as against priority, I arise just to make two illustrations. We will suppose for instance—and this is not quite a supposed case, but will probably be an actual one—that an important railroad has two stations, suppose between different parts of Pennsylvania, 100 miles or so apart, and that the safety of lives of passengers on trains depends upon messages to shift trains in the failure of telephone and telegraph in case of stormy weather, for which case these stations are mainly designed to be used. Now, suppose such a case, and suppose this bill has given the navy priority, which means whenever the naval station at League Island chooses to speak every other operator must keep silent. You can easily see how this would endanger the lives of a very great number of passengers while a naval officer gives some trifling order, as for his overcoat to be sent up. And I might cite an incident on this point. In Philadelphia, when engaged in some experimental tests by messages between New York and Philadelphia, we were taking testimony for the use of the court in order that the court might decide property rights; we had nine messages sent and these tests required them to be sent without tuning. We were from 1 o'clock till 6 o'clock sending from New York to Philadelphia, and we were interrupted a large part of the time by the naval station at League Island, and one of the messages that I learned was sent was an order by an officer to have somebody send his wife's mackintosh and rubber shoes to the theater door. I had no control over the station at which we were sending these messages. I was there as an attorney witnessing tests, but this operator stated that it was understood generally that the naval stations had priority, and that whenever the navy spoke everybody else must keep quiet. Now, that is an illustration of what will happen, and what always happens, and necessarily happens. The lives of passengers on a railroad train or a steamship may be endangered because a naval officer wishes his wife's rubber shoes sent to the theater.

Suppose, however, he had had a reservation. Suppose he had a certain road, which is reserved entirely to him. He not only has priority, but he has the whole road.

Senator BOURNE. Like a private wire.

Mr. CLAY. Like a private wire. That is possible. The attempt here is to make it appear that this law is required by the interests of somebody other than government officers, but I state emphatically that this bill is for the benefit of the United States Navy and Army, and nobody else. I will say boldly that it is not for the benefit of any individual or inventor or investigator; that it is not necessitated by the state of the art at all as it now exists, and that by reason of the instruments we now have (I do not say that they are known to the people generally, but from the applications in the Patent Office to be published in a short time) the art is such that the instruments at the receiving station can completely and absolutely cut out all possibility of interference from any station except the one it chooses to receive from. I can illustrate that, sir, in a technical way if necessary, but we will take the simplest illustration, because I know the Senators do not care to listen to any technicalities.



The principal instrument by which that tuning is done is a coil of wire. Suppose a coil of wire as long as this table [indicating], and there is every conceivable wave length. The receiving instrument is tuned by sliding a button along that coil. Suppose a coil as long as this table to represent all ranges of wave lengths in commercial use at the present time. The sliding of this button half an inch along that coil would tune that instrument.

Senator BOURNE. Do you indicate the length of the wave lengths?

Mr. CLAY. That will mean that that receiving instrument will respond only to a wave length between 600 and 800 meters, for example, and it will not respond to any other length except that. It goes all through. If the length is 700 or 600 or 800 meters the wave length—

Senator BOURNE. This would necessitate, then, that all stations in the army or the navy or the Government should have some kind of instruments similarly attuned.

Mr. CLAY. That is all.

Senator BOURNE. Could they then receive messages from your instruments?

Mr. CLAY. Whenever they chose to. It is nothing but a matter of sliding the button up the coil.

Senator BOURNE. Then I do not see how it is feasible for you to use this private wire that Senator Piles was using as a simile.

Mr. CLAY. There is an almost inconceivable number of wave lengths that can be used. The law would prevent any but the Government stations sending some particular one, so the Government's messages sent in that wave length could not be interfered with by outsiders; other wave lengths do not interfere. We consider it a great concession on our part to submit to any regulation at all. And it can not possibly do any good—I venture to say that it is not wanted by Marconi, or the United Wireless Company, or by this company, or any successful company.

Senator BOURNE. Why wouldn't it do you good? Why wouldn't it prevent interference in commercial operations?

Mr. CLAY. Because the instruments that receive the message themselves can do everything which this bill is designed to do. Interference can be cut out by the instrument itself. Now, we will admit that there are some crude and archaic instruments used in which interference is possible and in which absolute tuning out is not possible. For the benefit of those we are perfectly willing to concede that the distress calls ought to have priority. We admit that everybody ought to stop, no matter what wave length is used, when this call is sounded. But as to the United States Government departments, we can not see where the justice is in those departments first taking possession, as they have done, of inventions of other people—not theirs, for they have taken other property—our property very largely—as the courts have decided in some instances—they have taken our property, used it, and then propose to enact a law by which whenever the navy chooses to send any messages, all the rest of us must keep quiet until it is through, without any restrictions or any reservations.

We believe that passenger ships ought to be required to carry a wireless-telegraph set. We believe that distress calls should always have priority over everything else, and we believe that it would be

perfectly just to set aside for the use of the Army and Navy an exclusive wave length. Let it choose that at its own sweet will. We do not want to dictate the wave lengths. We are perfectly willing to have the President designate those wave lengths that are needed, and those wave lengths that will hereafter be needed as the art progresses. But we know this—I know it very well because I am the attorney for an inventor who is well up in the advance of the art—the situation of this art has developed up to the point where no legislation is necessary, if this kind of modern apparatus were used. Now, you can see that it is possible that next year or the year after that this legislation would be useless and inadequate, because the instruments themselves can do exactly what it is the purpose of the law to do, namely, prevent interference.

Senator BOURNE. You are willing to operate under certain restrictions?

Mr. CLAY. That is what we perfectly willing to do. Every operator should be made responsible for what he does. That can be accomplished by making him register.

Senator PILES. Have you any other objections to this bill?

Mr. CLAY. We object to being licensed rather than registered. We object to the Executive making regulations unrestrictedly, and to priority rather than reservation. With those three exceptions we are willing to have the bill go through. Now, in regard to the objection to the executive department making the regulations, whatever may be said to the contrary, I ask Senators to pay attention to section 6 of this bill, which reads as follows:

SEC. 6. That the Secretary of Commerce and Labor shall have power to make regulations prescribing the form and manner in which applications for licenses under this Act shall be made and respecting the granting of such licenses, and regulations, by wave lengths or otherwise, suitable to secure the due execution of the provisions of this Act, and from time to time to add to, modify, amend, or revoke such regulations as in his judgment may seem expedient; and such regulations when so adopted shall have the force and effect of law.

Now, I can not conceive how the Czar of Russia could have any more absolute power than that here given the Secretary of Commerce and Labor. Here the Government is using property that is not its own and is doing exactly as it pleases, and proposes, as is provided in this bill, to use that property to the exclusion of everybody else—even the rightful owners of it—when they could as well be provided with a certain roadway down which the Navy Department and all other departments may go and have exclusive right of way. A parallel has been drawn between wireless telegraphy and line-wire telegraphy, but there is no parallel any closer than between a speaking tube from this room to the next and a man speaking in a crowd with another man's ear sufficiently tuned to receive what he wants to hear.

The line wire is tangible property; it is evident; it is subject to control from one end to the other. The Government, of course, may control it. There priority is necessary, because two people can not use it at the same time to any exclusive degree. ) )

Senator BOURNE. Do you prefer registration to license?

Mr. CLAY. We do.

The CHAIRMAN. I think that this one company has had as much of the time of this committee as it ought to have.

There is a young gentleman here who wanted to be heard.

**STATEMENT OF MR. W. E. D. STOKES, JR., REPRESENTING THE JUNIOR WIRELESS TELEGRAPH CLUB OF AMERICA.**

Mr. STOKES. Mr. Chairman and honorable members of the Committee on Commerce of the Senate, we appear before you as delegated representatives of the Junior Wireless Club of America (Limited), an organization of boys who have devoted much earnest study to radio-communication and who have already contributed to the development of this science with the firm belief that they still have more to contribute and who want the help and protection of your honorable body.

As president of this club, I wish to register with you our opinion of the bill now in your committee, known as No. 7243, introduced by Senator Depew, of New York, for the purpose of regulating wireless communication.

We agree as to the importance of licensing all professional, as well as amateur, wireless operators, but only upon the basis of a merely nominal fee of 50 cents or \$1. We also believe that such a license should be revoked forthwith for malpractice at any time, such as in case of war or intentional interference in important messages, and the sending out of false calls for aid, or refusal to answer calls for aid, or to send along such messages.

We would even go further than does this bill in regard to the qualifications necessary for securing a license. For instance, we believe that every person who takes out a license should be either a born citizen of the United States, or should declare himself to be a citizen, and he must understand the Morse code—for many, especially the ocean-going steamer operators, understand only the continental code, and must agree to obey all government regulations.

Every licensed amateur operator must promise to forward government messages when requested so to do, and to state every year what kind of apparatus he has in use, the wave length he uses, and any other information deemed necessary, and the Government should issue with the license its regulations and instructions, how and what the operator is to do in case he receives a call for aid on matters important to the Government.

However, we feel there is more in this bill which arouses our protest than there is which meets with our approval.

We protest against the bill for these reasons:

First. We believe that in actual practice the provisions of this bill would discriminate heavily against the amateur and in favor of the commercial wireless companies, which are for the most part only stock-jobbing corporations and members of a great trust.

Second. It is impossible and impracticable in some of its features.

Third. It is ambiguous and capable of interpretation unfair to amateurs and students of wireless.

Fourth. It is unjust to a large body of manufacturers.

Fifth. It is contrary to the best interests of the United States as a nation.

Sixth. If passed, it will stifle the ambition and really great inventive genius of American boys.

Seventh. Should proposed Senate bill No. 7243 or House bill No. 23495 become a law, it would require, to enforce it, a force of at least 1,000 to 5,000 expert wireless engineers, whose salaries would not be less than \$200 a month each, with a system of double stations in each locality to get triangulation, scattered all over the United

States, which would cost the Government millions of dollars to establish and millions every year to operate.

First. The Western Union Telegraph trust has already absorbed all the telegraph business of this country, even having a working agreement with its supposed rival, the Postal Telegraph Company. It has also absorbed the Bell and Long Distance telephone companies in this country, which it recently acquired by purchase of a major part of their stock. Do they now hope to "corner" wireless? Soon some vast trust will be organized to "corner" the very air we breathe.

United Wireless has gone into bankruptcy several times only to be reorganized to bob up again under a different name. Ever since a boy in Portland, Me., got the first message from the *Connecticut* on the return of the fleet from its trip around the world, thereby putting to shame and rage all the professional operators and stations, these stockjobbing, so-called "wireless companies" have not ceased to make war on us boy operators, and unjustly accuse us. I have never heard of a boy sending false messages or making trouble.

These wireless companies' operators are ill paid, receiving in some instances only \$5 per week; in others, as a maximum, only \$40 per month and board, these last being operators on the big trans-Atlantic vessels. These operators are untrained for the most part and understand nothing of the real science of their work, their skill being limited in most cases merely to sending and receiving messages. Of all the instruments employed by these companies only very few have apparatus that will cut out interference or that will send with anything like equal efficiency at all hours of the day or night, under all atmospheric conditions and at all seasons of the year.

United Wireless has in New York three or four high-power stations, one of which should be sufficient for all actual use. The others are used simply as advertising features, helping to persuade people to buy their stocks. Up on the New England coast, and, in fact, throughout the whole country, can be found many stations now abandoned, which were originally set up by United Wireless as means of getting people interested in their "work," and later of securing their hard-earned money for their water-logged issues of stock. They have press and advertising agents, who cover the country making misstatements for the purpose of selling their stocks. Circulars issued by their chief brokerage firm, P. C. Kullman & Co., of 68 Wall street, show that nine different kinds of United Wireless stocks are traded in.

Now, our earnest belief is that this bill would work heavily in the interests of United Wireless and the other companies, or possibly even of the Western Union combination, which for a long time confined its activities to wire communication, but which may now have taken United Wireless under its wing. This bill will enable this vast trust absolutely to control radio-communication and by its severe regulating measures put out of business all amateurs and prevent the public from enjoying in the near future a cheap method of communication.

This bill will unintentionally compel the public to pay toll to the Western Union trust for all wire messages, whereas if we amateurs are left undisturbed and allowed to experiment we are sure that within ten years, at little or no cost, everyone in the land will be able to communicate with any person he desires to reach within a limited radius. For instance, within ten years a man in his automobile, meet-

ing with an accident 25 miles from home, will be able to signal on a specific wave length, call up his own home by ringing a bell there, bring his butler to the telephone, and tell him the cause of his delay, and that he will not be home for dinner.

We protest against any aids to monopolizing of the very atmosphere.

Second. One provision of section 1 of this bill is that federal control shall apply to all interstate wireless communications. This provision is ridiculous, impossible, and impracticable. It is impossible to regulate wireless as you gentlemen regulate interstate commerce. One day a wireless instrument may carry 10 miles and the next day 100 miles, depending upon the atmospheric conditions. Moreover, the bill would simply annihilate the hundreds and hundreds of stations of amateurs in New York alone, since the Jersey shore is but a mile or two distant. A man would have to be in the central part of a State and use only the lowest power instrument of say one-eighth kilowatt, in order to keep within the provisions of this bill; otherwise, one might innocently break the law and be compelled to pay a \$500 fine and have his instruments confiscated by the Government, and if the student had worked for years and made valuable discoveries all future and possibly present benefits that he would otherwise derive would probably be lost to him.

Third. The provision in section 7 for tax of \$100 for land stations and \$5 for sea stations is ambiguous, or at least capable of an interpretation unfair to amateurs, for though it is provided that no fee shall be required for "the conduct of experiments in radio communication" there is too much indefiniteness as to what an experimental station is. How is that to be decided? A strict interpretation of section 7 might shut out all amateurs and students, and we are inclined to believe that a strict interpretation would be applied, working to us a serious injustice. And, moreover, in "the conduct of experiments in radio communication" the student, if not put out of commission by this section 7, would probably be hit by section 1, should a message from his instrument be detected in a State near by the one in which he was experimenting.

This bill seems to catch the amateur operator coming and going, in one way or another, and will cause his license to be revoked, no matter how hard he tried to prevent it. It would be hard to imagine a bill more suitable to the interests of the large trusts I have mentioned. And the very fairness of the phraseology might act to the detriment of the amateur and the student and to the benefit of the trusts while the general public would each year be the losers by many millions, for within a few years wireless telephony will be in ordinary use, unless some such hindrance to American genius as this bill is enacted.

Senator Depew, in his letter to us of March 17, says: "The object of my bill is that every user of a wireless instrument shall be properly registered and have a license for a moderate fee," and in his bill, under section 7, he says, "But no fee shall be required for any license granted for the conduct of experiments in radio-communication." Well and good. But suppose the boy, or a group of boys, decided to send paid messages by wireless telephone or telegraph over their own instruments, under this bill, they could not do so, for they would no longer be classed as experimental stations. And why should

they not be permitted so to do without having to pay a fee of \$100 per year? Would it not be just as reasonable to tax a man \$100 per year for having a telegraph wire running from his office to his home a few blocks away? Or to another man's office a few more blocks distant? Even now, in the days of the predominance of the Western Union trust, anyone who buys a telegraph instrument from the Western Union trust and strings his wires, can send a wire message, and will not have to pay \$100 a year for the mere right to send messages. You are also aware that the Bell Telephone Company, now absorbed by the Western Union, refuses to sell any telephone instruments, but will only rent them, thereby getting a large annual income from the public, and if you have instruments of another company or instruments of your own invention, they will not allow a message to be received or sent by them.

This bill, which makes cheap communication for the public by wireless an impossibility by eliminating any private stations that might send paid messages, simply forces the people back again to costly communication by wire over the telegraph and telephone instruments of the great "communication trust"—the Western Union.

From the arguments one reads, your honorable body and the public are given to understand that radio-communication is likely to be almost exclusively used in the future only on shipboard. Believe me, gentlemen, the reverse is sure to be the case, and these trusts know it. I often pick up Galveston, Tex., various places in Canada, Duluth, Minn., Chicago, and especially a small 2-kilowatt station in Michigan, and I often catch messages between Pittsburg or Washington and Brant Rock. To-day a system is being established between Rio de Janeiro on the east coast of South America and Valparaiso and Lima on the west coast; this whole outfit will cost less than \$200,000. It will wipe out telegraph and cable lines which have cost millions to establish and millions each year to maintain; why the cutting down of trees and underbrush each year alone cost \$250,000 or more.

Fourth. There are in this country to-day a large number of manufacturing concerns which turn out wireless apparatus for amateurs; for instance, in New York City there are such companies as the O. T. Lewis, Frederick Collins, and the Wireless Importation Company, which now manufacture most of its apparatus in Connecticut. Besides, there are many boys who make a living by making and setting up wireless apparatus and teaching other boys how to run it. These companies and these boys are all doing a large and legitimate business. If this bill becomes a law and is strictly enforced, these companies would be at once ruined for no amateur would care or dare to continue his experiments or his purchases from these houses. We hold no brief for such concerns, please understand, but in all fairness, is not their business as worthy of fair consideration as that of one or two grasping corporations?

Fifth. This bill is contrary to the best interests of the United States as a nation. You ask why. Because the best interests of our country demand immediate improvement in methods and means of wireless communication. The system of wireless aboard the ships of the navy and those installed elsewhere in the army and navy stations are sadly inferior to those of foreign powers.

Now, the way to improve such conditions is not by passing a bill like this, which will hinder the development of wireless, for it will give a great trust almost exclusive control in the field and close the door of opportunity to amateur operators, students, and inventors.

Our battle ships have not increased in efficiency and power in proportion to the population and power of the United States, and our wireless system is also far inferior to that of any other first-class nation in the world. The systems of the navies of Japan, England, Russia, and Germany are far superior to ours in every respect. The messages of the British Admiralty, sent on a uniform wave length and in a secret code, positively can not be deciphered by those for whom the messages are not intended.

Recently, when the United States Government sent their representatives to Venezuela to conduct negotiations for the settlement of the difficulty between Venezuela and ourselves, three of the ships of our navy equipped with wireless were taken for the purpose of getting Washington nightly into communication with our representative in that Government, as Castro had cut the French cables. To the astonishment of our officers it was found that they were unable to send messages more than 50 or 100 miles, so in order to accomplish their purpose they had to string out the three ships in a row between Fort Antonio and Venezuela.

The systems of wireless on our battle ships should be such that every ship could send 1,000 miles and receive 2,000 miles, and two or three special ships of each fleet should be able to send 2,000 miles and receive 4,000, so that no fleet of our Government would be out of range of Washington, in which city should be established the very best possible type of central station. Every ship should have an apparatus of the same up-to-date type, instead of the many different antiquated systems now in use, most of which lack means of cutting out interference and which use wave lengths varying from 450 to 1,000 meters, as you can see from consulting the United States Government Report of October 1, 1909.

Let our Government use a uniform wave length and a secret code for transmitting government messages, and, with the proper kind of instruments, they would have no complaint to make of interference from private or public stations.

Mr. Chamberlain, Commissioner of the Bureau of Navigation, Department of Commerce and Labor, in a letter to us of March 15, 1910, says that Admiral Sperry told him recently that he was in constant communication with Washington in the round-the-world cruise until he got within two or three days of the home shores. We believe that the admiral's wireless-apparatus operators did not represent things to him quite as they were. We know the official government report, previously quoted, states that the *Connecticut* had on board at that time an instrument of the antiquated Shoemaker type having only a 3-kilowatt transformer. Any expert will tell you that an instrument with only a 3-kilowatt transformer could not under the most favorable conditions send over 450 or 500 miles, more probably only about 400 miles on the average. With this instrument an operator could not possibly cut out interference or work with equal efficiency under all atmospheric conditions at all hours of the day or night, and at all seasons of the year. Surely the operator misled the good admiral as to the real cause of trouble in

communication. Why to-day most all the ocean-steamer messages are transferred or relayed from ship to ship within a radius of 500 miles at most.

I think, gentlemen, I have shown that there are strong reasons why this bill should be contrary to the best interests of the United States as a world power. All this interference complained of by the navy operators was due to the commercial companies, not to amateurs.

Sixth. We feel that the greatest objection against this bill is that if it is passed it will stifle the ambition and great inventive genius of American boys. We boys of to-day are the citizens of to-morrow. We have, many of us, already chosen wireless as our line of work. There are vast possibilities, great discoveries, and marvelous inventions yet to be revealed in the study of radio communication. We boys want a try at the great rewards that are sure to come to the successful experimenter and inventor in these lines. Wireless is not mere play for us boys, as some seem to think. We love the work, hence the name amateur; but it is always the amateur or lover of a line of work who produces results.

A few years ago only a very few boys were studying wireless. To-day there are between 25,000 and 40,000 in the United States alone. As I said, it is not mere play for them. It makes them thoughtful, observant, and trains them in the laws of cause and effect, and is, in short, an education and discipline for them.

Believe me, they are all keenly interested in the attitude of our Government toward wireless, and they expect fair play.

Gentlemen, this Government is on record as a protective Government. You protect our cotton factories, our steel-rail mills, and our tobacco growers. Why not at the same time protect our amateur inventors? The returns to the Government from such protection will surely equal or exceed those from the protection given to the wool-growers of the land.

Article I, Section VIII, clause S, of the Constitution of the United States says that Congress shall have power "to promote the progress of science and useful arts," etc. With this power, gentlemen, goes the responsibility for promoting the progress of science and useful arts, and wireless is bound to be one of the greatest.

The people who are to-day using and paying to the great "communication trust" unreasonable toll for the use of wires will then have only to buy a wireless instrument for a few dollars and then will be able to talk to their friends with little cost. Most every State in the Union has done away with "tollgates" on land. Does our Government now propose to pass an act to establish tollgates in the air? Soon the paths to heaven will be beset by tollgates.

The men and women of the United States will be able to typewrite a message and have a duplicate made of it at the same time in the Morse code on chemically prepared paper, which can be placed in a clock mechanism and be sent out and received by the desired person on his own special wave lengths. He or she also will be able to communicate within a radius of 400 miles by wireless telephony. We boys ask only for a chance to work these things out. Do not hamper us. I have wireless applications in our Patent Office for small patents which have been granted. I hope some day to discover something that will be a great use to the world and to my own personal benefit.

I have a telephone plant which will operate within a radius of 50



miles. If we amateurs are allowed to operate and experiment, the radius will be extended indefinitely at 500 miles, and if we are allowed to experiment we shall be able to do without aërials to a great extent.

In connection with our work let me say that we amateurs are blamed for much that we do not do. The cases where amateurs actually interfere are few and exaggerated. In many cases antiquated apparatus and incompetent professional operators are responsible for the trouble. A good operator with an up-to-date machine can cut out atmospheric and interference and continue his work.

It has been stated that many "fake" messages have been sent to our fleet during its maneuvers for the purpose of causing confusion in orders and out of a wanton desire to make trouble with government operations. We wish to go on record that none of our members have ever caught any such messages and believe such reports exaggerated. We have, however, heard fake messages sent out by some of the stations of these water-stock-jobbing so-called wireless companies. In one instance we intercepted a message purporting to come from Eiffel Tower, Paris, France, which we know was sent out by one of the officers of this company mentioned from a station within the confines of Manhattan Island for the purpose of making people believe their company had solved trans-Atlantic communication.

Few of the present expert wireless operators understand the basic principles of wireless. I know about a boy belonging to our club who went to a wireless station the summer before last and found a wireless expert there packing his things to go back to New York, as he could not make the apparatus work. This boy within five minutes got the apparatus working because he understood the principles of wireless, and yet this man who failed was said to be one of the best operators in the employ of the corporation.

Let the Government adopt a wave length for its official use. We will "keep off the grass," we assure you. In fact, we are ready to go much further than that and state that we boy operators stand ready to extend our organization throughout the United States, forming clubs, the members of which will take oath if necessary to help the Government and to help in all cases of need of emergency. We have the very best interests of wireless at heart and we want you lawmakers to feel so.

In return we hope the Government will be fair to us and will not shape its laws so as to discriminate in favor of selfish stock-jobbing corporations and a great trust. We are boys of American ideals, chief of which stands that of liberty of thought and action. We feel indeed that the air we breathe should remain free to all. We demand that we be allowed freedom in a work of wonderful possibilities. We hope you will not report Senate bill No. 7243 out of your committee without amending it as we have suggested.

Seventh. In case the Senate passes bill No. 7243, and the House passes House bill No. 23495 and it becomes a law, to enforce this act would require an army of at least 1,000 to 5,000 expert wireless engineers, whose salary per month would be not less than \$200 each. It would require the building all over the United States of a double system of wireless stations in every locality, so as to take the triangulation, to locate the offender, for a wireless aerial will be just as operative if strung within a house (in the cellar or any portion of the house), or along the eaves of the house, as it will in the air. It is

just as easy to conceal the aerial as it is to conceal the operator. With the new methods of radio transmission, the location of the operator could be absolutely concealed. There would be no noise, no spark to indicate his location. He might have a dozen aerials, a mile apart, which would only cost from \$2 to \$5 each, connected to some one locality, or a dozen localities, where the operator could be concealed, and while the engineers were trying to locate one apparatus by triangulation the offender could be operating another one a mile away, or 2 miles away. And it would require the cooperation of several skilled radio engineers to locate each apparatus.

To substantiate this statement, any of us would guarantee to prove that it will take at least a month for the government aerial engineer detectives to discover our locality, for the engineering calculations would be so intricate it would take days to locate the exact position of the offender.

Is our Government prepared to establish a detective bureau of wireless police, which will be fully as expensive, if not more expensive, to carry on as the United States customs-house?

We desire to file with your honorable committee copies of this our argument against this bill; also a copy of circular issued by P. S. Kullman & Co., stock jobbers in wireless stocks; also an analysis of the financial condition of the United Wireless Company made by the Financial Review.

We thank you for permitting us to appear before you.

The CHAIRMAN. Whom do you represent?

Mr. STOKES. The Junior Wireless Telegraph Club of America.

The CHAIRMAN. Where is it located—in New York?

Mr. STOKES. Yes, sir. I will present Mr. Eltz.

#### STATEMENT OF MR. GEORGE ELTZ.

The CHAIRMAN. Whom do you represent, sir?

Mr. ELTZ. I represent the Junior Wireless Clubs and Engineers of America.

Gentlemen, I may add a word to this interference with which we are charged. There is a lot of interference caused by the amateurs in New York City. It is not intentional, however, in any way. We all have instruments, and whenever a commercial station or the navy or any big station in the city requests us to keep off, we do so, but there is a lot of interference because the naval stations and the other stations can receive greater distances than the amateurs, and an amateur coming on at night goes up to his instrument and listens and hears nobody working. It may be the navy-yard has told everybody to be quiet; so he starts to operate; he breaks up the navy-yard and the navy-yard says he interferes. It is entirely unintentional, and if the apparatus of the navy was up to date, as some of the Fessenden apparatus is, there would be no such interference. I think the bill is entirely unnecessary.

The CHAIRMAN. How many more desire to be heard against the bill?

Mr. BOTTOMLY. I would like to say a few words.

Senator PENROSE. Shall we sit for an hour longer, or meet again? I am only asking for information. I am going to the Senate to report a bill.

The CHAIRMAN. I think the Amateur Club has been heard sufficiently. You can leave your written statements here.

Senator NEWLANDS. Will they be printed, Mr. Chairman—are you going to have the hearings printed?

Senator BOURNE. We can decide that later.

Senator NEWLANDS. I did not know but what you had made some rule.

Senator PILES. We can get through in ten minutes.

Senator PENROSE. I had a matter that I wanted to bring up, of some importance, in the Senate.

The CHAIRMAN. We will now hear the Marconi people.

### STATEMENT OF JOHN BOTTOMLEY.

Mr. BOTTOMLEY. We are opposed to this bill, first, on the ground that the time has not yet come when wireless telegraphy should be made the subject of a bill, because we are to-day experimenting. The art is not well known yet, and if we are regulated to certain wave lengths we will be unable to carry on experiments.

Senator BOURNE. Do you represent the Marconi people?

Mr. BOTTOMLEY. Yes, sir.

As a general principle, we do not think it is time for the bill. That is the chief objection to bills of this class. To the bill itself we have several objections. We hold that too much power is given to the Secretary of Commerce and Labor by sections 3 and 6. The President, as you are aware, is to make wave lengths. Secretary of Commerce and Labor is able to rescind all those wave lengths and do whatever he chooses in the matter, and we object to that.

We also object to giving the army and navy precedence over commercial business. We are doing a very large commercial business, and if we had to stop that business while the army and navy wishes to send messages, we should be at a very great disadvantage, because we can only hold communication with our outgoing boats for a short time.

I should like to read from the New York Times:

Now comes Senator Depew with a bill that gives exemption from "interference" and priority of dispatch, in time of peace, in radio-electric messages in behalf of the army and navy over the wireless messages of commerce.

It is a mischievous measure. Must the splendid wireless operations of the trans-Atlantic lines and of the radio-telegraphic companies on land, which are showing such marked development, be suspended whenever two subalterns choose to greet each other through the ether? It is granted that, in time of war, naval and military messages should take precedence over commercial messages; but during peace the rights of commerce should always and everywhere be held paramount.

This bill is doubly mischievous in that it confers upon the Secretary of Commerce and Labor, an official who can know nothing about the technical demands of private wireless business, practically unlimited power of determining its conduct. And why should wireless companies, which pay their proportionate share of taxes in each State, be compelled to pay an additional license fee when no such fee is exacted from wealthy land companies? The Depew bill shows other unjust discriminations and some vagueness in its terms. But its vital defect is the assumption, in these piping times of peace, that the most important business of the nation is that transacted through the army and navy.

We have no objection to the registration of operators, but we do object to paying a license fee, and under the provisions of the bill it is not very clear how these license fees would be enforced. I do not know whether the license fee of \$100 is for a land station, or

whether operators are to pay licenses. But we do object, as we are getting nothing in exchange, to have to pay a license.

Senator BOURNE. You agree as to the entire feasibility of the establishment of zones or rights of way? The allotment of wave lengths; that is absolutely feasible, is it?

Mr. BOTTOMLEY. Yes, sir; for instance, I will give you a little illustration. We have a station at South Wellfleet, Cape Cod, which is a high-power station, and we have a station at Siasconset, Nantucket Island. When the *St. Paul* goes out with a short-wave coil, and the *Lusitania* with a long-wave coil, the South Wellfleet station will send a message to the *Lusitania*, and it will go over the *St. Paul* and strike the *Lusitania* without interfering with the *St. Paul*. At the same time our station at Siasconset will not interfere with the *Lusitania*.

Senator BOURNE. And you concede the desirability of having certain zones set aside for the exclusive use of the Government and for the exclusive use of relief messages, do you?

Mr. BOTTOMLEY. Yes; if it is found necessary. For ourselves we do not ask for it, and we do not require it. I want to say this, too, that we experience but very little interference in our work. Our apparatus is now tuned so fine that we can work in New York Harbor when the navy is working to Washington and elsewhere; when the Telefunken is working; when the United Wireless is working; by simply using a shorter wave length. We can communicate with all the vessels and keep our work going all the time.

As for these young gentlemen operators, I wish to say that we have never been interfered with by them in any way, shape, or form. We never notice them. They never have been reported to us by any of our operators, nor have they interfered with us whatever. We have no objection to their going on as long as they like. They are simply playing with it; in some cases, dangerous; in some cases, useless; but we don't mind that. All we ask is to be left alone to work out our own salvation. We do not think it is right that we should have to pay license fees, nor do we think it right—

Senator BOURNE. You do not object to the identification of the operators, but you do object to the monetary consideration?

Mr. BOTTOMLEY. I think so. At any rate it is not properly defined in this bill. I do not know whether it will be one fee for them or one fee for a year or whether it is to apply to an operator. We can not control an operator. If he had to be licensed, it would have to be paid by the men. We are not opposed; we would like to see legislation which would cause all ships that are traveling, even with crews—just as much with crews as with passengers—to be equipped with wireless. We would be glad to see any such bill passed, but as for interfering with the general workings of companies, we object to it on the ground that we ought to be allowed to work so as to perfect our apparatus.

Senator BOURNE. To divert just a minute from this bill; you have seen the compulsory interchange bill that has been introduced?

Mr. BOTTOMLEY. You mean that all commercial stations should interchange messages?

Senator BOURNE. I have heard that there was an objection from your company. I want to ask you if you are cognizant of that?

Mr. BOTTOMLEY. We would certainly object to it.

Senator BOURNE. Upon what grounds?

Mr. BOTTOMLEY. Upon the ground that we have established all the good stations. We have gone to an enormous expense. We have spent \$250,000 in establishing our work——

Senator BOURNE. This only applies to vessels and the welfare of the public and property.

Mr. BOTTOMLEY. That is not necessary. That is to-day absolute. We exchange messages with every ship afloat, every station on shore; with us and the United Wireless; with us and Telefunken in cases of disaster or danger of any kind whatever.

Senator PILES. This does not interfere with commercial messages?

Mr. BOTTOMLEY. We object to it because we do not need that. One of our general orders is that what we call a C. Q. D.—C. Q. is a signal they send out along the land lines to-day. If you are traveling between New York and Washington and want all stations to call you then send C. Q.—D. added to this call means danger. When the call C. Q. D. is sent in, every operation ceases on all our boats everywhere, instantly. Any person not doing that would be immediately dismissed.

#### STATEMENT OF S. S. BOGART.

Mr. BOGART. Mr. Chairman and gentlemen of the committee, I beg to state that this bill as a whole would be the first practical move in the direction of the regulation of wireless. The assignment of wave lengths is an absolute necessity, and the proper person in the Department of Commerce and Labor could establish the kind of wave lengths that should be used at stations whether on ship or on shore.

But the word "otherwise" we strenuously object to. That is in clause 4. And in clause 6 the same remark applies to the term "otherwise." We believe that, inasmuch as we have upward of 300 boats and 128 stations, we should not be compelled to pay \$100 license for those stations already established. Fifty dollars would be proper. I could tell you a great deal upon the subject of experiments in radio communication. I think I am the most practical telegraph operator in the room. I have been in the business since 1860, and I wish to state to you that I know the wireless business pretty thoroughly. I am now an executive officer and do not give so much time to the operation. I want to state to you that that clause should be eliminated.

Senator BOURNE. What clause is that?

Senator PILES. What does it say?

Mr. BOGART (reading):

But no fee shall be required for any license granted for the conduct of experiments in radio communication. All fees for licenses shall be turned into the Treasury of the United States, and a statement of all these collected in each fiscal year shall be reported to Congress.

This company has two large factories and is turning out over thirty sets of machinery per week, and we carry on our experiments in those factories in our two laboratories without any effort to control the air. We do not use the air for it, and we do not think it is necessary to take the air as it has been taken and used by others for experiment arbitrarily. I do not care to enter into those subjects and set up a long argument with regard to it; but I believe that that bill, with

those exceptions, would be a proper measure for the adoption of the Senate—to become a law.

The CHAIRMAN. We will close the hearing for the day.

(Thereupon, at 12 o'clock and 15 minutes p. m., the committee adjourned.)

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**OBJECTIONS TO CERTAIN PROVISIONS OF THE BILL (S. 7243)  
TO REGULATE RADIO COMMUNICATION, AND AMENDMENTS  
THEREOF SUBMITTED FOR THE COMMITTEE'S CONSIDERA-  
TION.**

I.

The bill provides, among other things (p. 4):

SEC. 4. For the purpose of preventing or minimizing interference with messages or signals relating to vessels in distress or of naval or military stations and private or commercial stations, the President of the United States shall establish from time to time regulations, by designation of wave lengths or otherwise, *to govern said private or commercial stations.*

Mr. Greene, chairman of the Committee on Merchant Marine and Fisheries, in his report on an identical bill (H. R. 23595), said most truly, "The core of the bill is in the fourth section." This contemplates giving *unrestricted priority* over commercial and scientific work in radio communication (1) to vessels in distress and (2) stations of the army and navy. Obviously, the communications of vessels in peril and those of the military and naval stations will constitute but a small part of the business transacted by wireless. When the art shall have reached a stage where communication by wireless can be effected with as great certainty and accuracy as communication by telegraph or telephone, a great part, if not all, of the business now transacted by wire will be transacted by wireless. One advantage of wireless over wire will be found in the great saving in the initial cost of plant and its maintenance.

Again, wire lines are subject to breakage, from which wireless is free. The superiority of wireless due to this immunity from breakage due to storms has already been recognized by the Pennsylvania Railroad, which has ordered wireless apparatus for use on part of its line, where the telegraph service is subject to disarrangement and the line is difficult to repair. Still, this bill would make the commercial business, of infinitely greater volume and of importance, scarcely secondary to that of the two privileged classes of messages wholly subordinate to them. If it were *necessary*, or even *advantageous*, for them to give calls of distress from vessels at sea and military or naval communications *unrestricted priority* over other business, it might be conceded that such priority should be given for humanitarian and patriotic reasons, *but it would be unnecessary, and would not be to their advantage to do so.* Instead of authorizing the President to create *unrestricted and unlimited priorities* for distress signals and military communications, as contemplated by the Depew bill, the object of that bill, viz, to protect them against interruption and interference, can be accomplished as well and even better by authorizing the President or the Secretary of Commerce and Labor to set apart *reservations for their exclusive use*, forbidding private or commercial stations to encroach upon those reservations, and leaving the entire territory or area out-

side of the reservations free for the use of the general public. The latter plan of regulation is contemplated by a bill (H. R. 22558) introduced in the House of Representatives by Mr. Burke, of Pennsylvania. Under this plan, a distress call or a military message could be sent, within its own reservation, with practical certainty of not encountering interference and of being promptly received. Commercial or private stations could operate outside of those reservations without fear of interruption by some privileged communication. Under the system of regulation contemplated by the Depew bill, privileged messages would be subject to interference, innocently created, by private stations, and no private station could commence to operate, with certainty of completing its business, before being required to discontinue in favor of a privileged station. In short, the Depew bill, under the guise of making more liberal provisions for the protection of distress calls and public business than the Burke bill, would fail to protect them as efficiently, and the manner of doing so would prove a greater burden and detriment to commercial work and the development of the art through scientific investigation.

## II.

### GENERAL DESCRIPTION OF RADIO COMMUNICATION.

Radio communication is produced by vibrations of a medium called ether. Ether pervades all space, extending throughout, and indefinitely beyond, the limits of the solar system. It is by vibrations of this medium that light and heat are transmitted from the sun to the earth and other planets. The ether, then, is not peculiar to any locality or nation, or even to this planet.

The vibrations by which radio communication is established are produced by a series or train of electric sparks, generated by the uttering or sending apparatus of a wireless station. The vibrations are called waves, and the length of the wave produced can be measured and controlled accurately. The waves go out in all directions from the uttering or sending apparatus, varying in intensity in a ratio inverse to that of their distances from the point of origin. An illustration, though incomplete, of the radiation of such vibrations is the production of ripples by throwing a pebble in a pool of still water.

## III.

### INTERFERENCE AND ITS PREVENTION.

The waves of ether by which communications are transmitted have some characteristics in common with vibrations of the atmosphere that convey sound. To illustrate: If the C note on a piano be struck, the sound waves, produced by the vibration of the C string, radiate and will cause the C string of a violin in the same room to vibrate sympathetically, while the D string on the same violin will not vibrate, because it is not in resonance with the C string of the piano. In like manner in radio communication, a receiving apparatus far distant from the uttering or sending apparatus will vibrate in sympathy with the latter, if properly attuned; otherwise it will not do so. If the etherial waves radiating from the sending station reach a receiving

station in resonance with it, the latter will vibrate and record the message uttered by the sending station. But if there be a receiving station comparatively close to the one recording the message, having a different tune, the waves will not cause it to vibrate, and it will not record the message.

Interference in wireless communication is occasioned by two sets of sending or uttering apparatus radiating waves of practically the same length at the same time and in sufficiently close proximity to one another to cause a mingling of the waves. By adjustments, suitable to enable them to radiate waves of different lengths, two sending stations, comparatively close to one another, may operate at the same time without causing the least interference with the operation of either or of the receiving stations adjusted to record their respective messages.

Complaints of interference with distress calls and public messages have become quite frequent and bitter. Up to the present time there has been no attempt to regulate radio communication. Each uttering or sending station and its receiving stations have suited their own convenience in adopting the wave length employed by them. At times chaotic conditions have resulted. To cure this, as far as possible, was the object of the Burke bill, its design being to set apart certain wave lengths or ranges of wave lengths for the exclusive use of the government stations and another range of wave lengths for the exclusive use of shipboard stations uttering distress calls. The respective receiving stations would be kept in attunement to respond to such waves and the messages would be received with certainty. Private stations employing wave lengths outside of those ranges would not disturb them.

Very efficient appliances have been discovered for the protection of receiving stations against interference. In a report dated April 17, 1905, Rear-Admiral H. M. Manney, U. S. Navy, Chief of the Bureau of Equipment, said:

The interference preventer will practically exclude any wave varying in length by as much as 3 per cent from the wave to which the preventer is adjusted, provided the intensity of such interfering wave is not greater than that of the wave to be received. As the interfering wave increases in relative intensity, the difference in wave length must be increased also. Unless very accurately adjusted the interference preventer absorbs part of the strength of the wave and the more imperfect the adjustment the greater the absorption. The adjustment of the interference preventer is somewhat difficult, but once made it is practically constant.

With this connection it is possible to absorb or shunt to earth waves so strong that close connected they will burn out the receiver and at the same time to build up a weak resonant wave to sufficient strength to be read. *A variation of 10 per cent in wave length has been found sufficient to cut out waves so strong that they could not be received direct either on the electrolytic or coherer receivers, while at the same time a weak wave which the coherer would just record was plainly received on the telephone. With waves of more nearly equal intensity a variation of 3 per cent in length is ample.*

#### IV.

UNRESTRICTED PRIORITY IS UNNECESSARY FOR THE PROTECTION OF DISTRESS CALLS AND GOVERNMENTAL COMMUNICATIONS.

There being an indefinite number of wave lengths available for communication between any two points, it is absolutely unnecessary to give the government or distress calls *a prior right to the use of all,*



when, by giving the *exclusive right* to certain wave lengths or ranges of wave lengths, sufficient to prevent interference, the rest of the field can without detriment to them be left open for all proper use by the general public.

## V.

## AMENDMENTS TO THE BILL SUBMITTED FOR THE COMMITTEE'S CONSIDERATION.

While it is believed that the plan of regulation contemplated by the Burke bill adheres more closely to scientific principles and would afford a better system for the protection of wireless business than those contemplated by the bill under consideration, it is thought that, with certain amendments, the latter might be enacted without doing serious wrong to the commercial and scientific interests concerned in radio communication and at the same time prove of greater benefit to the Government than the regulations now contemplated by the Depew bill.

The amendments suggested are: From the words "Sec. 2," page 2, line 20, strike out all down to the word "States," page 3, line 6, and in lieu thereof insert the following:

The owner or owners of apparatus designed for the transmission or receipt of signals or messages by wireless telegraphy or wireless telephony and located within the jurisdiction of the United States, including all such as are or may be installed on vessels of the United States, before engaging in business or uttering or transmitting any signal or message, shall file with the Secretary of Commerce and Labor a sworn statement, showing its ownership, location, and construction. The said Secretary shall preserve a record of all such stations, and upon the filing of any such statement shall issue to the owner or owners of the station described therein a certificate, containing a designation or number by which such station shall be known and which it shall always use and employ when uttering signals or calls and when acknowledging the receipt of the same.

The objectionable portion of the Depew bill provides that licenses for wireless stations shall be issued by the Secretary of Commerce and Labor, not as a matter of course, but in his discretion, and that before the issuance of any such licenses, persons desiring them shall file applications, containing such information about their apparatus and business as the Secretary may call for. Furthermore, the license is to be given on condition that the licensee shall not only obey all existing regulations, but such additional regulations as the Secretary may in future see fit to prescribe. There is not in this country either a federal or State statute authorizing so extensive a control of private property or such a curtailment of individual rights. A wireless station is innocuous in every tangible sense. The only ground on which its operation could be regulated is that it might interfere with the operation of some other wireless station. To avoid favoritism in the granting of licenses and the creation of monopolies repugnant to our laws and institutions, the system of licensing wireless stations should be placed on the same basis as that of the registration of vessels. That is to say, a register or license shall be issued by some one department on application and *as a matter* of course, and a record of the registration preserved, simply to enable the Government to locate encroachments upon wave lengths reserved for the exclusive use of distress calls and messages of the army and navy, or other violations of the regulations authorized, 7

Section 4 of the bill should be amended as follows:

In line 11, page 4, strike out the word "establish." Same line, after the words "time to time," insert "designate reservations by." Line 12, after the word "otherwise," strike out "to govern said" and insert "for distress calls and for the exclusive use of the United States and all agencies thereof and all." Lines 13, 14, and 15, after the word "stations" in line 13, strike out all that follows down to and including the words "of law and" in line 15, and in lieu thereof insert "shall be and are hereby forbidden to infringe upon the reservations so designated. This requirement shall."

The objectionable features of this section of the Depew bill have been reviewed. Without affording better protection for messages of the privileged classes, it would, without any necessity, impose a serious burden on commercial interests and prove a great hindrance to development of the art. The only reasons why the Government is asking for an unrestricted priority, at this time, are those of convenience: (1) It would relieve public officials from deciding, at this time, what they want, and (2) it would enable public officials to continue the use of old and inferior apparatus. On such paltry grounds Congress should hesitate to adopt regulations which would inflict loss on private interests and jeopardize the advance of the art.

Section 5 should be amended as follows:

In line 25, page 4, after the word "station," insert "operating within the limits reserved for the exclusive use of distress calls or the United States."

The purpose of this amendment is to make the section conform with section 4 as revised.

Section 6 should be amended as follows:

After the word "regulations," page 5, line 6, strike out all that follows down to and including the word "regulations" in line 9.

After the word "regulations," page 5, line 12, strike out the words "as in his judgment may seem expedient."

The purpose of this amendment is to make the section conform with section 2 as revised.

Section 7 should be amended as follows:

In line 15, page 5, strike out the word "may" and insert in lieu thereof the word "shall."

In line 22, strike out the words "one hundred" and insert in lieu thereof the word "ten."

In issuing licenses the Government is giving no right of property or privilege which does not obtain as a natural right to every individual. Nor would the expense of conducting the business of registration or regulation justify so exorbitant a charge as \$100 from each shore station. It is by no means improbable, in fact it is expected by many well versed in the business, that the wireless telephone will, in the near future, supersede the telephone now in use. The propriety of a federal tax of \$100 on each telephone now in existence, is a thing too absurd to require discussion.

Section 9 should be amended as follows:

In line 11, page 6, after the word "shall," insert "within the reservations assigned to them."

In line 14, after the word "shall," insert "within the reservations assigned to them."

The purpose of this amendment is merely to make the section conform with section 4 as revised.

JAMES H. HAYDEN,  
F. W. H. CLAY,  
*Attorneys for the National Electric Signaling Company,  
of Pittsburg, Pa.*

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MARCONI WIRELESS TELEGRAPH COMPANY OF AMERICA,  
*New York, May 2, 1910.*

HON. WILLIAM P. FRYE,  
*Chairman Committee on Commerce,  
United States Senate, Washington, D. C.*

DEAR SIR: When I had the honor of appearing before your committee on Thursday last I was not aware of the procedure, and in consequence did not make up any brief to be filed.

If it is not inconsistent with the rules of the committee I should feel very much obliged if you will permit the inclosed to be filed as our arguments against the passage of bill S. 7243. A copy of this has been sent to each member of your committee.

Yours, respectfully,

MARCONI WIRELESS TELEGRAPH COMPANY OF AMERICA,  
By I. BOTTOMLEY, *Vice-President.*

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The Marconi Wireless Telegraph Company of America is strongly opposed to any legislation regarding wireless telegraphy which in any way would enjoin, retard, prevent, or delay further research and experiments in the art about which there is still so much to be learned. The avoidance of interference, the elimination of atmospherics, which to-day are the most important matters on which experiments are being made, can only be thoroughly done if the experimenter is left free and untrammelled to work out the problem, and would specially oppose legislation which might militate against vessels flying a foreign flag wirelessly equipped and conforming to the rules of the Berlin convention communicating with land stations in the United States.

If, however, it is considered well by the Committee on Commerce that the bill before it should be favorably reported on, the Marconi Wireless Telegraph Company would most respectfully suggest that—

Section 1 be amended so that a license, or at least a proper examination similar to that required for commercial operators, shall be ordered for operators employed by the Government, for the simple reason that to-day government operators are the worst offenders in the way of interference, chiefly caused by lack of ability to quickly bring their instruments into proper adjustment.

Section 2 should more clearly set forth by whom and under what conditions, by examination or otherwise, the license is to be obtained. The license in this section would seem to apply to the stations and the license in section 3 to individuals. And section 2 should also set forth that if stations are closed in time of war certain compensation should be given.

Sections 4 and 6 should be carefully considered in conjunction with each other. Section 4 gives the President power to make certain regulations and wave lengths, and section 6 gives the same power to the Secretary of Commerce and Labor, and also gives the latter power to "modify, amend, or revoke" such regulations. Surely this could not be intended, and with all due respect, the Marconi Wireless Telegraph Company would ask the committee to consider whether the President and the Secretary of Commerce and Labor have sufficient knowledge of wireless telegraphy to create and establish wave lengths, or whether such would virtually be done by officers in the army and navy; if so, these claims would be altogether objectionable.

In creating wave lengths most careful examination should be made into the working conditions of commercial companies, especial attention being invited to the fact that all vessels plying on the Atlantic Ocean wirelessly equipped, comprising a fleet of over 300 vessels, employ under the provisions of the Berlin conference two wave lengths, one of 300 meters and one of 600 meters, which vessels communicate with the shore stations in America and Canada, all of which are similarly equipped, and care should be taken not to create such limitations as would prevent such commercial working which, at certain congested stations, is only possible by the use of wave lengths of under 100 meters at certain times and over 400 meters at other times.

Sections 5 and 9 should be amended by striking out the words in section 5 "or from any naval or military station" and section 9, "and subject to such priority, messages by, to, or on behalf of the army or navy of the United States shall have priority over other messages."

Messages from or to naval or military stations, except in very rare instances, are, in the opinion of the general public, of no greater importance than regularly paid commercial business, and the national press has in many instances most strenuously objected to such preference being given. The majority of all the messages by or between naval vessels, as reported to us by our station operators, are of a purely personal nature and are not worthy of consideration. It is also to be noted that in exchange for valuable concessions over and under highways the land-line companies gave certain concessions in cost of messages and priority of sending to the United States Government, but no equivalent is offered by present measures to the wireless companies for protection and priority.

Section 12 would appear to be inoperative, as it does not seem possible that for an offense committed on the high seas, and without the territorial limit, any offender could be punished.

The Marconi Company would also ask the committee to consider the question of the justice of forcing struggling wireless telegraph companies to pay license fees when none are exacted from wealthy land-line companies, always taking into consideration that wireless companies pay their proportionate share of taxes in each State in which they operate.

Careful consideration of this bill shows so many irreconcilable inconsistencies and difficulties of construction that the bill should be reported unfavorably.

MARCONI WIRELESS TELEGRAPH CO. OF AMERICA,  
By I. BOTTOMLEY, *Vice-President.*

PROVIDENCE, R. I., *April 27, 1910.*

HON. GEORGE P. WETMORE,

*Washington, D. C.*

DEAR SIR: The Rhode Island Wireless Association, an organization composed of inventors and experimenters in the science of radio telegraphy and telephony, appointed a committee on legislation, of which I am chairman, at its last regular meeting, with instructions to take such measures as might be possible looking to the protection of the rights of the so-called "amateur" as affected by the several bills now pending in Congress in regard to the regulation and control of the operation of private stations.

The chief necessity for such regulation and control arises from the dangerous and willful, vicious and unwarranted interference with official and semiofficial messages, and it is unfortunately a fact that some law applicable to this nuisance should be speedily enacted by Congress.

The trend of opinion hitherto has laid the greater part of the blame for this interference upon the shoulders of the so-called "amateur" by those who would debar all individual effort from the development of this rich field of science and invention in order the more profitably to exploit it for the interests which they represent.

The tone of the communication of the Navy Department quoted in the report (Union Calendar No. 170), of the House Committee on Naval Affairs on the Roberts bill (H. J. Res. 182), and of all the statements in the daily press and by the representatives of the so-called "commercial" interests, is to foster and lay stress upon the gross iniquity and culpability of the "amateur" in this respect, while a careful perusal of the report cited will prove that such is not the case upon the showing of the Navy Department in that report.

Of the 16 cases of "flagrant" interference therein cited you will find but *four* traced and ascribed to the "amateur," while no less than *eight* of the remaining 12 cases were directly caused by these same "commercial" interests, and of these eight several were of the most inexcusable, deliberate, and dangerous of all the cases mentioned.

In spite of this it has been the policy of these interests to make much of the wickedness of the amateur while making light of their own acts, and so to influence the course of the proposed legislation now pending in both branches of Congress as to debar all individual effort in the line of development of this science in the only possible and practicable way in which such individual experiment can exist.

I am told that one of the "commercial" companies is already using the fact that the legislation now proposed will give them a practical monopoly in the establishment of stations as an advertisement of their stock, which statement is in itself a sufficient indication not only of the probable result of the enactment into law of the bills, or any of them, in the form in which they are now under consideration, as well as of the attitude of these same interests toward the legitimate and honest inventor.

This association is ready and glad to assist in the enactment and enforcement of a suitable law upon the subject, but we wish to protest against the enactment of any law which will deprive any bona fide student of the opportunity of investigating the principles of the science by actual and practical experiment, and we, furthermore, wish to enlist your active efforts to see that the latter class of students

may not be injured by the enactment of unfavorable laws on the subject.

As the several bills now before Congress stand no provision is made for the representation of these so-called "amateur" interests on the commissions proposed to investigate the subject and frame the law to apply thereto, while the greater sinners against aerial courtesy and etiquette, the "commercial" interests, not only are provided with two-fifths of the representation, but can easily acquire absolute and entire control of these commissions as proposed, even to the detriment of the government interests themselves.

We would earnestly request, therefore, that you give this matter your immediate and careful attention and use your efforts so to frame any congressional enactments as to preserve to the much maligned "amateur" the opportunity to develop this vast field of scientific knowledge without imposing too much of a burden.

Very respectfully,

SAMUEL W. BRIDGHAM, 2d,  
*Chairman Committee on Legislation, R. I. Wireless Association.*

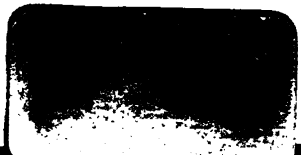
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